

3. Field positions, clarity and overall quality

For retinopathy screening purposes in England two images are taken of each eye. These have overlapping fields of view and between them cover the main area of concern in respect of sight threatening diabetic eye disease. In accordance with the camera specification, the field of view will normally be a minimum of 45° horizontally and 40° vertically per image.

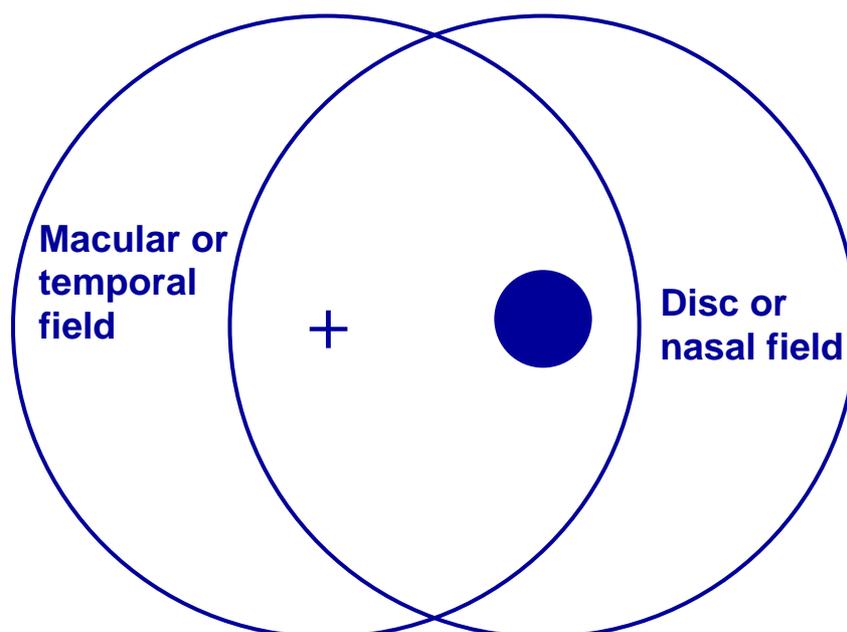
Taking two images has a number of advantages:

- It places the 2 important areas at the centre of each image.
- It covers a larger area of retina than one image alone.
- It helps to differentiate artefacts from pathology.

The two fields to be captured have a larger area of overlap than might be felt necessary but were chosen to simplify the capture by allowing the use of the internal targets of the fundus camera. They also allow a simple assessment of image positioning.

The two fields are:

- Macula centred, giving coverage of the temporal retinal.
- Disc centred. Giving coverage of the nasal retina.



Positioning

All images are assessed for position and are regarded as good, adequate or inadequate as follows:

Macula field

Good: Centre of fovea ≤ 1 DD from centre of image

Adequate: Centre of fovea > 2 DD from edge of image

Inadequate: Failure to meet definition of **adequate** above

Disc field

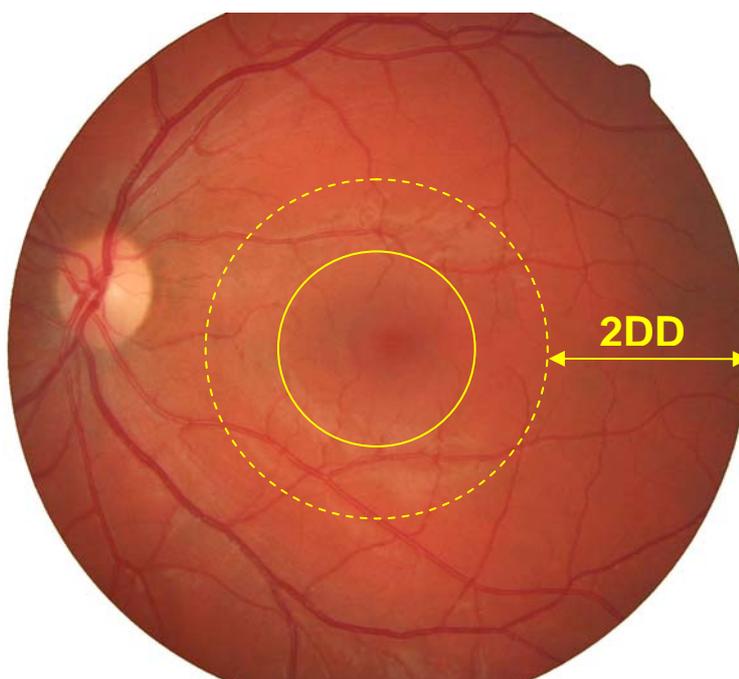
Good: centre of disc $\leq 1DD$ from centre of image

Adequate: all of optic disc $>2DD$ from edge of image

Inadequate: Failure to meet definition of **adequate** above

Note: Some large discs may meet the 'good' standard yet also be closer than 2DD to the edge, which is normally 'unacceptable'. In these cases, 'good' takes precedence.

To qualify as a **good** position the target (fovea or centre of disc) must fall within the centre circle which represents a circle of radius one disc diameter. For **adequate**, the fovea or any of the disc must not fall outside the dotted circle which is 2 disc diameters from the edge.



Clarity

Images must also be assessed for clarity, by reference to the visibility of small blood vessels, as follows:

Macula field

Good: vessels clearly visible within 1DD of centre of fovea
and visible across $>90\%$ of image

Adequate: vessels visible within 1DD of centre of fovea

Inadequate: Failure to meet definition of **adequate** above

Disc field

Good: fine vessels clearly visible on surface of disc
and visible across $>90\%$ of image

Adequate: fine vessels clearly visible on surface of disc

Inadequate: Failure to meet definition of **adequate** above

Any lack of clarity in the optical components of the eye may lead to poor quality images. The most common reason will be cataract, but other causes include corneal scarring, corneal dystrophies, any corneal distortion such as kerataconus and small pupils that do not successfully dilate. Lack of ability to fixate can make positioning of the field challenging.

In the case of small pupils, it may be possible to take extra images using the small pupil setting of the fundus camera such that, when all images are considered together there is satisfactory coverage of the area of concern. Where this is the case, common sense dictates that (assuming quality is OK) an assessment of adequate is made, even though each image in isolation may appear inadequate. Screening software does allow more than 2 images per eye to be taken and labelled “R/L Other”

Final assessment of overall quality

Each eye is assessed separately. For each eye, a combined assessment is made of both field position and image quality of the two images. In other words, for the right eye to warrant an assessment of good, the two images of the right eye must rate good for both position and clarity. If both images rate good for position, but one is only adequate for clarity, then the overall rating is adequate. If either position or clarity is inadequate for either image, then the overall assessment is inadequate with one exception – if referable retinopathy is visible anywhere then the images are regarded as adequate.

Images should only be utilised if the grader is confident the quality is sufficient and all grading must be performed by trained and accredited personnel.

External Photographs

It is normal practice to take an external eye photograph showing the red reflex when photographs are judged ungradeable. This will generally give a clue to anyone else viewing the images as to the cause of the problem.

You can take external shots in one of 2 ways:

1. Use the auxiliary plus lens and the camera in the initial external eye view position. Focus by eye on the monitor and take the picture. These can be difficult to judge for focus and are often less than sharp



2. Wind the focus to its extreme position, switch the camera to fundus view and then move the patient back. Either place your hand over the top of the brow rest and push the patient's forehead back, or ask the patient to make a fist and place it between their forehead and the brow rest. You should now find the external eye close to being in focus. With most cameras you can now see the split focus bars against the iris or upper lid. Align these using fore and aft movement and the image should be in good focus. You may need to increase the flash intensity due to the increased range. This method usually results in sharper but smaller pictures and is the method used for the photograph reproduced here.

